

“Efforts to Prevent Pandemics by Air Travel”

Testimony before the House Aviation Subcommittee
April 6, 2005 2:00 PM
2167 Rayburn House Office Building

Submitted by:

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Note: The information contained herein reflects the views and opinions of AeroClave, LLC management based upon their interpretation of the most current information and are not meant to misrepresent or misstate information for the purposes of influencing this committee or any other government agency.

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INTRODUCTION

My name is Dr. Ronald Brown, founder and Managing Partner of AeroClave, a Florida Limited Liability Corporation headquartered in Orlando, Florida. AeroClave was founded in 2003 in an effort to design and build an effective way to decontaminate the interiors of commercial aircraft from disease-causing organisms and prevent the global spread of disease or pandemics. We are privately funded and have, to date, received no funding from any branch of government.

BACKGROUND

My decision to start the company grew out of a discussion I had with local airport planners during my tenure as the EMS Medical Director of a Central Florida county. Their desire was to develop a quarantine center for ill and possibly infectious air travelers. I felt confident we could handle the patient side of it, but when I asked who was going to disinfect the aircraft there was no clear response. It was, and still is, my firm belief that unless you decontaminate the aircraft, you risk putting healthy people on sick aircraft, thereby perpetuating the spread of disease.

Today's aircraft have a highly advanced air circulation and filtration system. In-line HEPA filters trap even small viral particles preventing their recirculation in the cabin. Airflow from the aircraft's cabin air system flows out of the overhead vents and exits the cabin through return air grills located in the sidewalls near the floor. According to the Boeing website "the cabin air ventilation system is designed and balanced so that air supplied at one seat row leaves at approximately the same seat row, minimizing airflow in the fore and aft directions¹" The airflow is, generally speaking, from top to bottom, not front to back as many people believe. It is my belief that many aircraft acquired illnesses are not the result of recirculating air, but rather the direct hand-to-mouth transmission from touching contaminated hard surfaces, such as tray tables, seat belts or latches on overhead baggage compartments.

During flu season health experts advise constant hand washing because many illnesses are transmitted by touching contaminated surfaces and then putting your hands near your mouth and nose². So, theoretically, it is more likely that you become ill on an aircraft, not from the coughing and sneezing passenger three rows back, but from the passenger who sat in your seat on the previous flight that was ill with a contagious disease who then touched the tray table and seat belts. World Health Organization studies proved the SARS virus can live on hard plastic surfaces for up to 72 hours³. How many different passengers have sat in that seat over the past three days?

At the time, the SARS crisis was still evolving and was significantly impacting the airline and travel related industries. Though the SARS crisis was, by definition, a regional health emergency primarily affecting Southeast Asia and Canada, its effects were beginning to permeate the entire global economy. Though airlines and travel related industries were the hardest hit, SARS impacted banking and manufacturers whose operations were tied to Southeast Asian countries. Economists are still trying to

calculate the impact of the SARS crisis on airlines and other industries but estimates range into the tens of billions of dollars.^{4,5,6,7,8,9,10,11} It is staggering to imagine what the impact might have been had this evolved into a truly global pandemic, such as the evolving avian influenza epidemic of which public health officials now warn us.

The one indisputable fact that the SARS crisis did prove was, because of international air travel, new diseases can quickly spread around the world.¹² Before the advent of modern air travel, new diseases would emerge from time to time and be carried by travelers to new locations. However, because it took weeks and even months to travel from one part of the world to another, many times the disease became identified and isolation and quarantine measures were put into place helping to curb the spread. Though we have sophisticated medical monitoring and tracking programs that help identify new disease outbreaks, there is still the fear among public health officials that a new and highly virulent disease will emerge and spread to all parts of the globe before adequate measures can be put in place. It then becomes a problem of mitigation, which has historically been a more expensive process than prevention.

Should a pandemic develop as predicted, not only will the physical manifestations of the disaster need rectifying, but also the psychological aspects as well. In response to the SARS crisis devastating effects to the airline industry in 2003, the International Air Transport Association (IATA) released to its members a presentation entitled "Manage the Fear. Feed the Beast. Crisis Communications Response: Lessons for SARS." In it, John Hughes-Hallet, Chairman of Cathay Pacific Airways, was quoted as saying "In particular what we have experienced in the last two months is more or less complete collapse in public confidence regarding the safety of air travel."¹³ In short, until the public feels the aircraft are safe for them to fly in, that is, free of disease, the economic recovery of the airline industry will be more prolonged, if it happens at all.

DEVELOPMENT GOALS AND OBJECTIVES

AeroClave had three main objectives in the development of its product.

1. The process had to be effective and efficient. Time is money to the airline industry and any process that took too long would not be economically viable. Similarly, any process that was too expensive would place an undue burden on an industry already facing severe economic challenges.
2. The process had to be done without the addition of any harmful or corrosive chemicals nor could it leave any unpleasant odor. Cleaning agents and processes used in other industries might not be allowed due to the adverse effects on electronics, seals or other critical components.
3. The process should be done without endangering the health of the cleaning crew. In instances where there might be a high degree of suspicion of infectious agents, the process should ideally be accomplished without putting any personnel inside the aircraft.

After two years of research and development, we believe we have accomplished all of these goals with our AeroClave unit.

THE AEROCLAVE UNIT

The AeroClave unit is a self-contained mobile apparatus that manipulates the cabin air temperature and relative humidity inside the aircraft to create an environment that is lethal for a number of disease causing agents. The entire process takes approximately

2 ½ hours and costs approximately \$100 in consumables such as fuel and filters. There are no modifications required on the aircraft and regular ground handling crews can be trained to operate the equipment in approximately two to three days.

I'd like to go over a few of the features of the AeroClave unit:

1. It is self-contained with its own power supply and carries enough fuel to run for approximately 48 hours. It meets all DOT and EPA specifications and can be transported over the road without the need for any special equipment or permits.
2. It has an environmentally controlled operator's cab to protect the operator during all-weather operations.
3. It has onboard satellite communications that allow for real time data transmission to aircraft maintenance managers and provides a lasting record of the details of each decontamination cycle. It also allows us to download any new treatment parameters as determined by public health officials without the need of onsite reprogramming. It allows for remote diagnostics of the equipment and provides telephone communications for technical support from any location on earth.
4. It uses a closed loop system of hoses to prevent any leak of the potential pathogens into the local environment. Connections to the aircraft and the unit are made via quick connectors enabling a crew of two to hook it up in approximately 15 minutes without the need of any special tools. Again, no modifications of the aircraft are required.
5. Multiple units can be "daisy chained" if needed for larger aircraft or buildings.

OTHER APPLICATIONS

After the recent hurricanes that devastated many parts of Florida last season, we realized there might be additional uses for our equipment. After consultation with State and Federal disaster management officials we have added some additional features that increase its versatility.

During last year's hurricanes in Florida, a number of shelters were left without power and communications. With the addition of the Power and Communications Distribution Center to the unit we are able to pull up to a facility and restore power, conditioned air and/or heat and communications within 30 minutes.

On a recent visit by Pentagon officials, one officer commented how this system could be used to provide power and conditioned air or heat to field hospitals during the day and decontaminate them at night. They also felt this unit had broader applications. In addition to aircraft decontamination, they felt it would be useful to help control the spread of disease on ships, submarines and tactical ground vehicles.

CURRENT STATUS

Currently we have two prototype units and have carried out extensive testing on a recently decommissioned DC-9 that we purchased. We have completed the design of the production unit and the first units will begin rolling off the assembly line in early August 2005.

We have hosted numerous demonstrations for a variety of local, state, and federal officials. A number of representatives from the US Department of Defense up to and including two-star generals have witnessed demonstrations of the unit. We have recently been invited to participate in the FAA's Center of Excellence for Cabin Aircraft

Environment in Auburn, Alabama where our product will undergo efficacy and reliability testing.

We have recently begun negotiations with another company who is an industry leader in decontamination and sterilization about incorporating their technology into our system. By integrating these two technologies we believe we will have a comprehensive solution with a biological kill spectrum ranging from simple viruses to the most resistant spores, including anthrax.

From the outset, we have constantly sought the input from industry experts and potential end users in an effort to develop a product that, while effective in its primary mission, might be modified to allow it to be used as a regional asset by a number of different agencies at the local, state, and federal level. Whether it be decontaminating aircraft or other transportation vehicles or establishing and supporting field medical units and shelters, we feel the AeroClave unit could be a valuable asset in our nation's defense. Whether a naturally occurring pandemic or the act of a bioterrorist, AeroClave can help protect the country's transportation system and help mitigate the disastrous financial consequences of such an event.

Should the Federal government decide to invest in technology such as the AeroClave unit, we would suggest that they be viewed and staged as regional disaster preparedness assets, possibly under the control of FEMA or some similar agency. From a readiness standpoint, the first units should be stationed at the major international airports. Daily maintenance checks could be integrated into the responsibilities of those airports' emergency response agencies, e.g., the airport's fire department.

SUPPLY AND DEMAND

Although it is our primary goal to protect the transportation assets of the United States using AeroClave units to be produced at various US facilities, it appears our first customers will be from overseas. We are currently negotiating a contract for 100 units to an Australian company with global aviation operations. In addition, we have serious inquiries from qualified customers in Europe, Southeast Asia and the Middle East.

We believe that the threat of a rapidly spreading biologic emergency is real and that its effects on the US economy could be devastating. While no one system should claim to be the "silver bullet" we do believe the United States government should invest in equipment that can help stem the transmission of such diseases. We believe the AeroClave system can be a vital part of an overall strategy designed to protect the transportation assets of an economy that depends on the constant movement of people and goods. While this protection is not without costs, the economic effects of an uncontrolled epidemic could be disastrous. In addition, building this equipment takes time and demand from foreign customers could produce limited supplies of critical components for use in the United States.

CONCLUSION

With increasing frequency we read warnings from world health officials about the eventual, and some say imminent, outbreak of a deadly pandemic event.^{14,15} The CDC has estimated that a pandemic could have "severe" effects on the United States causing between 89,000 and 207,000 deaths and having an economic impact of between \$71.3 and \$166.5 billion¹⁶.

While many have become hardened and skeptical with the repeated warnings, our discussions with potential industry and government customers proves to me that these warnings are not going unheeded. It is reassuring that our government is also heeding the warnings as evidenced by this hearing today. I thank you for your leadership in addressing this problem and, as the Managing Partner of AeroClave; I thank you for the opportunity to speak with you today.

I believe the essence of what we are and why we started AeroClave can be summed up in a response from a potential customer when asked why he was interested in ordering now and in such large quantities. He replied:

“It was not yet raining when God ordered Noah to start building the ark”.

Respectfully submitted on April 6, 2005 by:

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References

1. http://www.boeing.com/commercial/cab_inair/ventilation.pdf **The Airplane Cabin Environment Issues Pertaining to Flight Attendant Comfort**, Elwood H. Hunt and David R. Space
2. <http://www.cdc.gov/ncidod/op/handwashing.htm> **An Ounce of Prevention: Keep the Germs Away**
3. http://www.who.int/csr/sars/survival_2003_05_04/en.html **First data on stability and resistance of SARS coronavirus compiled by members of WHO laboratory network**
4. http://www.timesonline.co.uk/printfriendly/0,,1_-3-658476-3,00.html **SARS panic will cause financial turmoil**, Oliver Wright, Lea Paterson, and Melissa Kite
5. **The Economic Impact of SARS**, Paul Darby, The Conference Board of Canada, 2003
6. **Business Travel; Even after SARS, Airlines suffer on Asian routes**, Edward Wong, New York Times, August 12, 2003
7. **SARS takes its toll on airlines**, BBC News, May 16, 2003
8. **SARS Impact Delaying Tourism Recovery**, Greg Thomas, Australian Tourism Export Council, July 24, 2003
9. http://www.iata.org/pressroom/industry_stats/2003_05_02.htm **International Traffic Statistics: April 2003**
10. **Singapore, Special SARS Analysis Impact on Travel & Tourism**, World Travel & Tourism Council
11. **Globalization and Disease: The Case of SARS**, Jong-Wha Lee and Warwick J. McKibbin, The Australian National University, August 2003
12. **Going Commercial; How Microbes Joined the Jet Set**, Lawrence K. Altman, New York Times, December 9, 2003
13. **Manage the Fear. Feed the Beast, Crisis Communications Response: Lessons for SARS**, International Airline Transport Association, 2003
14. http://www.who.int/csr/disease/influenza/en/H5N1_-9reduit.pdf **Avian Influenza: assessing the pandemic threat**
15. <http://www.cnn.com/2005/HEALTH/conditions/02/22/bird.flu.asia/index.html> **WHO bird flu warning at summit**
16. <http://www.cdc.gov/flu/avian/gen-info/pandemics.htm> **Information About Influenza Pandemics**